

CLAIMS

What is claimed is:

**BASIC SYSTEM**

1. A system for determining signal time of arrival in a wireless  
2 communication system, comprising:  
a searcher to analyze received signals to determine a correlation signal  
4 level at predetermined points in time, the searcher determining a maximum signal level  
at a selected one of the predetermined points in time; and  
6 a modeling processor to generate a mathematical model of a  
predetermined response function using the maximum signal level and correlation signal  
8 levels from predetermined points in time adjacent the selected time, the modeling  
processor using the mathematical model to determine a time associated with a peak  
10 correlation signal level.

**Correlation signal levels are RSSI**

2. The system of claim 1 wherein the correlation signal levels are  
2 based on received signal strength of the received signals.

**Signal levels are used to find coefficients in the model**

3. The system of claim 1 wherein the maximum signal level and  
2 correlation signal levels from predetermined points in time adjacent the selected time  
are used to determine coefficients in the mathematical model.

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**Function peak time is determined by coefficients**

4. The system of claim 3 wherein the coefficients in the  
2 mathematical model are used to determine the time associated with a peak value of the  
mathematical model.

**2<sup>nd</sup> order model**

5. The system of claim 1 wherein the mathematical model is a  
2 second-order mathematical function.

**Three signal levels are used to find coefficients in the 2<sup>nd</sup> order model**

6. The system of claim 1 wherein the mathematical model is a  
2 second-order mathematical function with three coefficients, the maximum signal level  
and two correlation signal levels from predetermined points in time adjacent the  
4 selected time being used to determine the three coefficients in the mathematical model.

**Model is a quadratic function**

7. The system of claim 1 wherein the mathematical model is a  
2 quadratic function having the form:  $y(x) = ax^2 + bx + c$ .

**Signal levels are used as coefficients in the model**

8. The system of claim 7 wherein the maximum signal level and  
2 correlation signal levels from predetermined points in time adjacent the selected time  
are used to determine coefficients in the mathematical model.

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**Peak quadratic function is determined by coefficients**

9. The system of claim 8 wherein the coefficients in the mathematical model are used to determine a time associated with a peak value of the mathematical model.

**Higher-order mathematical model**

10. The system of claim 1 wherein the mathematical model is a mathematical function greater than a second order, the maximum signal level and correlation signal levels from predetermined points in time adjacent the selected time being used to determine coefficients in the mathematical model.

**MEANS PLUS FUNCTION SYSTEM**

11. A system for determining signal time of arrival in a wireless communication system, comprising:
- analysis means for analyzing received signals to determine a correlation signal level at predetermined points in time and for determining a maximum signal level at a selected one of the predetermined points in time; and
- modeling means for generating a mathematical model of a predetermined response function using the maximum signal level and correlation signal levels from predetermined points in time adjacent the selected time, the mathematical model being used to determine a time associated with a peak correlation signal level.

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**Correlation signal levels are RSSI**

12. The system of claim 11 wherein the correlation signal levels are
- 2 based on received signal strength of the received signals.

**Signal levels are used to find coefficients in the model**

13. The system of claim 11 wherein the modeling means uses the
- 2 maximum signal level and correlation signal levels from predetermined points in time adjacent the selected time to determine coefficients in the mathematical model.

**Function peak time is determined by coefficients**

14. The system of claim 13 wherein the coefficients in the
- 2 mathematical model are used to determine the time associated with a peak value of the mathematical model.

**2<sup>nd</sup> order model**

15. The system of claim 11 wherein the modeling means uses a
- 2 second-order mathematical function as the mathematical model.

**Higher-order mathematical model**

16. The system of claim 11 wherein the modeling means uses a
- 2 mathematical model greater than a second order.

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## METHOD CLAIMS

### BASIC METHOD

17. A method for determining signal time of arrival in a wireless communication system, comprising:

analyzing received signals to determine a correlation signal level at predetermined points in time;

determining a maximum signal level at a selected one of the predetermined points in time;

generating a mathematical model of a predetermined response function using the maximum signal level and correlation signal levels from predetermined points in time adjacent the selected time; and

using the mathematical model to determine a time associated with a peak correlation signal level.

### Correlation signal levels are RSSI

18. The method of claim 17 wherein the correlation signal levels are based on received signal strength of the received signals.

### Signal levels are used to find coefficients in the model

19. The method of claim 17 wherein the maximum signal level and correlation signal levels from predetermined points in time adjacent the selected time are used to determine coefficients in the mathematical model.

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**Function peak time is determined by coefficients**

20. The method of claim 19 wherein the coefficients in the  
2 mathematical model are used to determine the time associated with a peak value of the  
mathematical model.

**2<sup>nd</sup> order model**

21. The method of claim 17 wherein the mathematical model is a  
2 second-order mathematical function.

**Peak quadratic function is determined by coefficients**

22. The method of claim 21 wherein coefficients in the second-order  
2 mathematical function are used to determine the time associated with a peak value of  
the mathematical model.

**Higher-order mathematical model**

23. The second-order mathematical function of claim 17 wherein the  
2 mathematical model is a mathematical function greater than a second order, the  
maximum signal level and correlation signal levels from predetermined points in time  
4 adjacent the selected time being used to determine coefficients in the mathematical  
model.

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